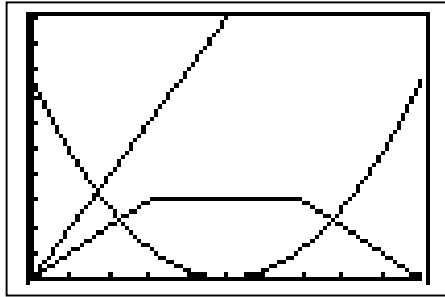# Activity #14: Math (Student version)
Technology: Lines, Parabolas, and More

Note to students: Lab teams of two or three students are required for this activity.

Purpose: To begin to understand the programs that make our technology tools so powerful
To investigate change over time
To model change as linear and quadratric functions

Materials: TI graphing calculator, TI-CBL and motion detector (Vernier probe) or TI-CBR, HIKER program for TI graphing calculator, TI-Graph Link, TI overhead grapher and view screen (optional)

Activity Procedure:
Part One:
Enter the following TI program in your calculator. Have your partner "proofread" your entry and then correct any typing errors.

Part Two:
Set up equipment by clearing a path, using a hallway in school works well. Connect the CBL, the motion detector and the TI graphing calculator. Place these on a desk with the motion detector facing the student who will walk the desired curve.
The motion detector collects data points every 0.1 seconds for 6 seconds, measuring the distance from the CBL in feet.   It detects motion as close as 1.5 ft.
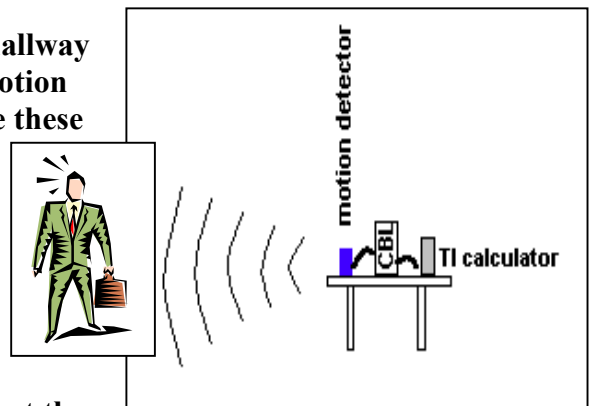

To generate curves, turn on all equipment. Start the program "HIKER". The program pauses at "PRESS ENTER TO START GRAPH". When the equipment and the walker are set to go, press Enter on the calculator to begin data collection as the walker begins to walk.
A graph of time vs. distance is displayed and data points can be traced.

Part Three:
**1. Walk a straight line with a positive slope.
Print this graph using TI Graphlink. TRACE
along the line and write down the coordinates of
two points.**
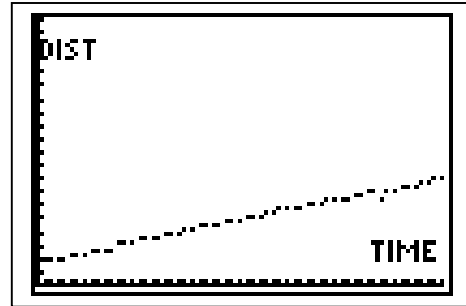
a. Find algebraically the linear equation that models the graph. Show all work.

**b. Perform a linear regression on the data collected. Remember that data for time,
the x-variable, is stored in L_2 and data for distance, the y-variable, is stored in L_3.
Write the linear regression.** _____
**How does this calculator generated linear equation compare to the equation you
found in part a?** _____

_____

**Put this equation in y_1 and graph again. This time both the scatter plot and the
function, y_1, will be graphed. Print this graph.**

**c. At what speed were you walking? Is this the same as your velocity? Why or why
not?** _____

_____

**2. Repeat the previous step for each of the following and find the equations that
model each, using any valid method (Show all work. Print appropriate LCD
displays using TI Graphlink.):**

1. **walk a line with a negative slope**
2. **walk a graph to model the absolute value**
3. **walk a curve that models a parabola that opens down**

3. Try to walk the graph given by the piecewise function,

$$f(x) = \begin{cases} 4x, & 0 \leq x \leq 3 \\ -x + 1, & 3 < x \leq 4.5 \\ x + 5.5, & 4.5 < x \leq 6. \end{cases}$$
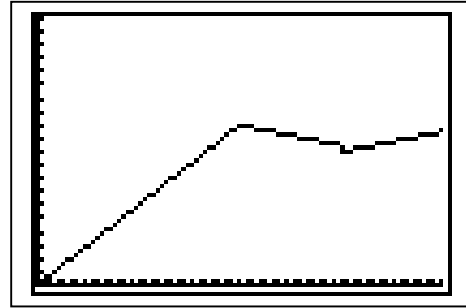
Describe your motion. Print a copy of the graph of the given function and the graph of your walk.

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Analysis:
Write a one-page paper describing the mathematics you learned and used in this activity. Describe how this activity helped you understand math better.

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